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PYROBAR

GYPSUM TILE

For FIREPROOFING
BEAMS :: GIRDERS :: COLUMNS

Better Protection - Lighter Weight - Quick Erection - Lower Cost

APPROVED BY NATIONAL BOARD OF FIRE UNDERWRITERS

It is well known that steel begins to lose its strength at about 500° Fahr., and at 1,000° Fahr., approximately 70% of its strength is gone. Temperatures such as these are easily reached in an ordinary fire, and if maintained even for a short time are almost sure to produce collapse of exposed steel structural members.

Page 136, 1915 Building Code, National Board of Fire Underwriters.

Real Steel Protection

The prime object of "fireproofing" structural steel is not so much to prevent the destruction of the steel by fire as to prevent its loss of strength when subjected to high temperatures. Obviously even though a material practically invulnerable to fire is used as the fireproofing material, it does not follow that any protection is given to the steel unless that material also *insulates the metal* and prevents the heat of the fire from reaching it and raising its temperature above 500 degrees Fahr.

It is one of the characteristics of Gypsum Tile that its temperature cannot be raised above 212 degrees Fahr.

Gypsum ($\text{CaSO}_4 + 2\text{H}_2\text{O}$) is mined as a natural rock—a crystalline combination of 79% calcium sulphate and 21% water. In the process of manufacture the rock is finely ground and heated until the water of crystallization is driven off. The product is then known as *Calcined Gypsum*.

When Calcined gypsum is mixed with water, it recrystallizes (sets) and a material chemically and physically corresponding to the original rock form is the result. Very briefly, this is the way PYROBAR GYPSUM TILE are made.

Gypsum Tile is the only material that has ever successfully passed the Underwriters' Laboratories' fire and water test for fireproof partitions.

UNITED STATES GYPSUM COMPANY

"World's Largest Producers of Gypsum Products"

205 West Monroe St., CHICAGO

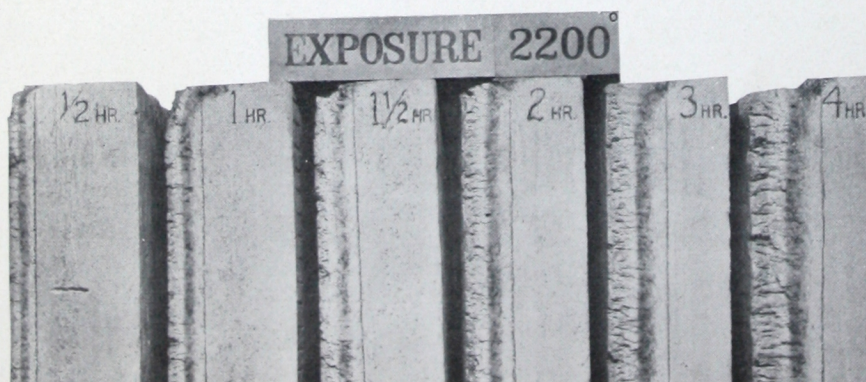
New York :: Cleveland :: Detroit :: Minneapolis :: Kansas City :: San Francisco

Why PYROBAR Bars Fire

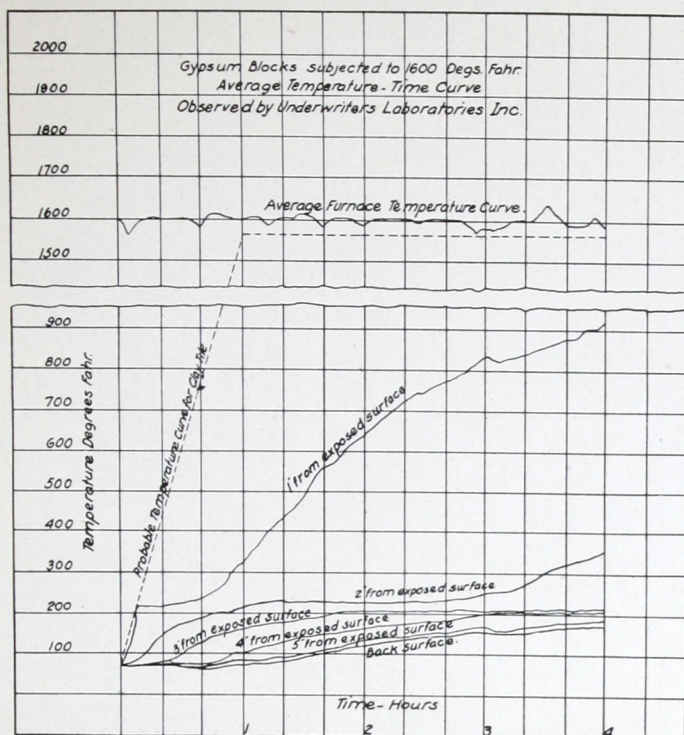
In the intense heat of a fire, PYROBAR slowly calcines on the side exposed to the fire. The calcined portion does not spall off or disintegrate as in other "fireproof" materials, but adheres to the tile and forms additional protection, reducing the rate of calcination as the fire progresses. *The temperature of the side opposite to the fire rarely exceeds 188 degrees Fahr. and cannot exceed 212 degrees Fahr.* Curves illustrating these phenomena of Gypsum will be found on page No. 3.

In addition to being the ideal material for steel protection, PYROBAR GYPSUM TILE, made in large units, are more quickly installed with less labor, more easily cut and fitted to columns, beams and girders and consequently cost less in place than other materials less efficient in protection.

On the right is a photographic reproduction of sections through Gypsum walls exposed to various temperatures for 4 hours continuously. Note adhesion of calcined material—no spalling—no disintegration. Repairs after fire easily effected.

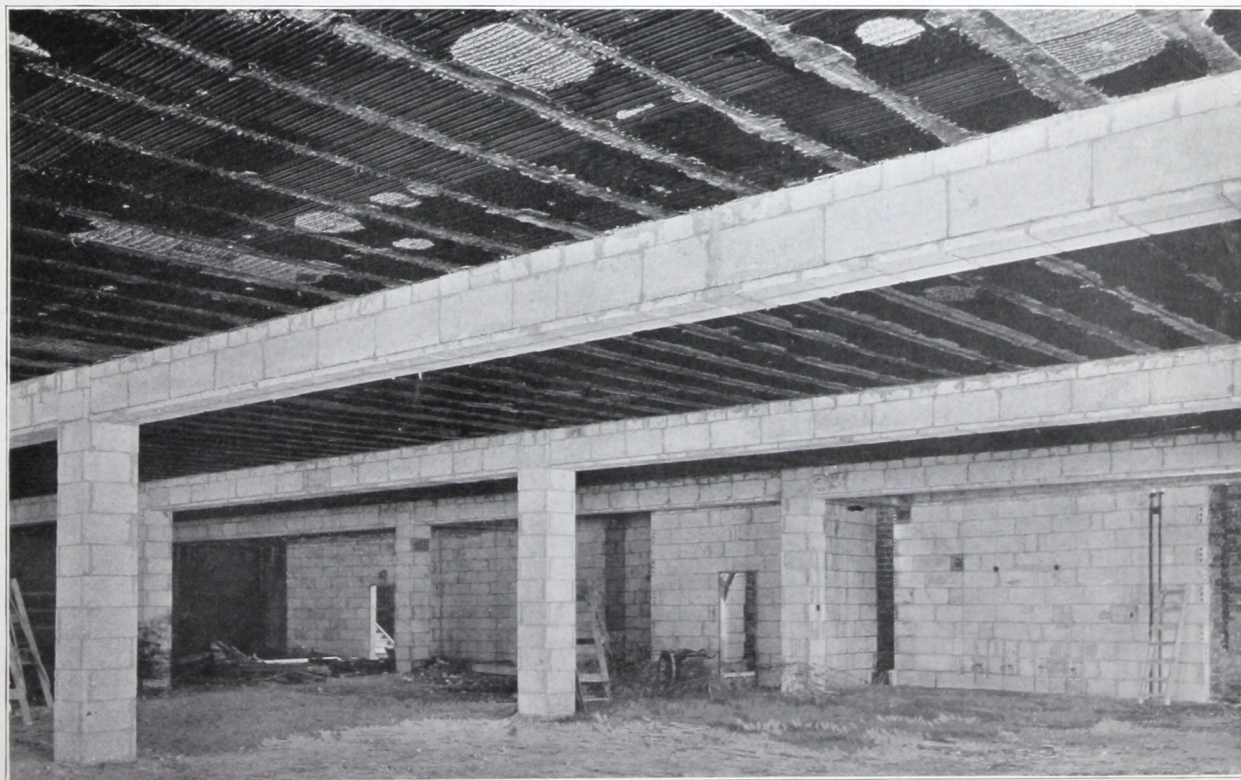


On the left are sections showing reduction in rate of calcination as fire progresses. Even under the intense heat (2200°) the unexposed side was never heated to 212° Fahr. *This photograph and the one above were reproduced from the test report of the Underwriters' Laboratories, Inc.*



The curves at the left (reprinted from the Underwriters' test report) graphically illustrate the temperatures at different distances from the exposed side as the test proceeded. Note the very slow increase in temperature after the calcination point (212°) is reached, and also that the surface opposite the fire never exceeded 180° Fahr. Uncalcined gypsum cannot maintain a temperature above 212° Fahr.

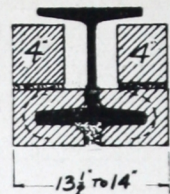
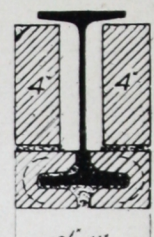
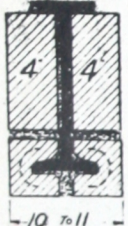
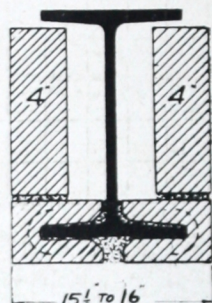
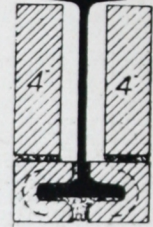
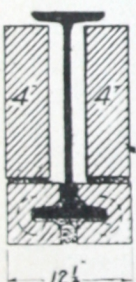
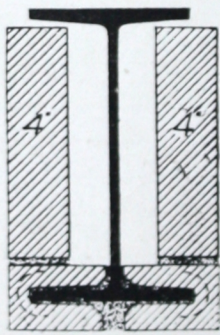
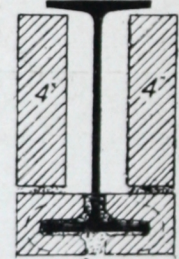
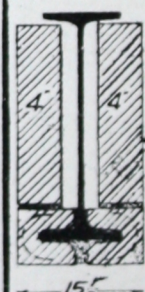
Like all materials, gypsum expands when heated—but since it cannot be heated in excess of 212° , its expansion under high temperatures is negligible (less than .0012% of its length). Thus in a gypsum protected column 10' high exposed to 1700° Fahr. the increase in length of the protection would be but .15 of in., as against 1.16 in. for concrete and .59 in. for clay tile fireproofing. The Gypsum protection cannot wreck itself lose through expansion.



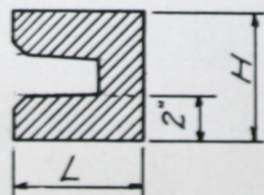
View showing Beam and Column Covering, Sweeney Houston Building, Detroit, Mich.
Smith, Hinchman & Grylls, Architects.

Note that all columns are square and beams in alignment due to uniformity of tile.

FIREPROOFING UNITS

STANDARD & SUPPLEMENTARY BEAMS	STANDARD CHANNELS	BETHLEHEM GIRDER BEAMS	BETHLEHEM I BEAMS
TYPE A SHOE  $8\frac{3}{4}$ to $7\frac{1}{4}$ SIZE OF BEAM 5-9 $\frac{3}{4}$ 6-12 $\frac{3}{4}$ 7-15 $\frac{3}{4}$ 8-17 $\frac{3}{4}$ 8-18 $\frac{3}{4}$ 9-21 $\frac{3}{4}$ 10-22 $\frac{3}{4}$ 10-25 $\frac{3}{4}$ 10-30 $\frac{3}{4}$	TYPE D SHOE  SIZE OF CHANNEL 5-6 $\frac{1}{2}$ 6-8 $\frac{1}{2}$ 7-9 $\frac{3}{4}$ 8-11 $\frac{1}{4}$ 9-13 $\frac{1}{4}$	TYPE D SHOE  $13\frac{1}{2}$ to $14\frac{1}{2}$ SIZE OF BEAM 8-32 $\frac{1}{2}$ 9-38 $\frac{1}{2}$ 10-44 $\frac{1}{2}$ 12-55 $\frac{1}{2}$ 12-70 $\frac{1}{2}$	TYPE B SHOE  $10\frac{1}{2}$ to $11\frac{1}{2}$ SIZE OF BEAM 8-17 $\frac{1}{2}$ 8-19 $\frac{1}{2}$ 9-20 $\frac{1}{2}$ 9-24 $\frac{1}{2}$ 10-23 $\frac{1}{2}$ 10-28 $\frac{1}{2}$ 12-28 $\frac{1}{2}$ 12-32 $\frac{1}{2}$ 12-36 $\frac{1}{2}$ 15-38 $\frac{1}{2}$ 15-41 $\frac{1}{2}$ 15-46 $\frac{1}{2}$
TYPE B SHOE  10 to 11 SIZE OF BEAM 12-27 $\frac{1}{2}$ 12-31 $\frac{1}{2}$ 12-35 $\frac{1}{2}$ 12-40 $\frac{1}{2}$ 15-36 $\frac{1}{2}$ 15-42 $\frac{1}{2}$ 15-60 $\frac{1}{2}$ 18-46 $\frac{1}{2}$ 18-55 $\frac{1}{2}$ 18-75 $\frac{1}{2}$ 20-65 $\frac{1}{2}$ 20-80 $\frac{1}{2}$ 21-5 $\frac{1}{2}$ 24-69 $\frac{1}{2}$ 24-80 $\frac{1}{2}$	TYPE E SHOE  SIZE OF CHANNEL 10-15 $\frac{1}{2}$ 12-20 $\frac{1}{2}$ 15-33 $\frac{1}{2}$	TYPE E SHOE  $15\frac{1}{2}$ to $16\frac{1}{2}$ SIZE OF BEAM 15-73 $\frac{1}{2}$ 15-104 $\frac{1}{2}$ 15-140 $\frac{1}{2}$ 18-92 $\frac{1}{2}$ 20-112 $\frac{1}{2}$ 24-120 $\frac{1}{2}$ 26-150 $\frac{1}{2}$	TYPE C SHOE  18 to 12 SIZE OF BEAM 20-59 $\frac{1}{2}$ 20-64 $\frac{1}{2}$ 20-69 $\frac{1}{2}$ 20-72 $\frac{1}{2}$ 20-82 $\frac{1}{2}$ 24-73 $\frac{1}{2}$ 24-83 $\frac{1}{2}$ 26-90 $\frac{1}{2}$ 28-105 $\frac{1}{2}$
TYPE C SHOE  $12\frac{1}{2}$ SIZE OF BEAM 24-105 $\frac{1}{2}$ NOTE: ALL SIDE FILLER TILE TO BE PYROBAR HOLLOW TILE.	TYPE B SHOE  $9\frac{1}{2}$ to $11\frac{1}{2}$ SIZE OF CHANNEL 2-10-15 $\frac{1}{2}$ 2-12-20 $\frac{1}{2}$ 2-15-33 $\frac{1}{2}$	TYPE F SHOE  $17\frac{3}{4}$ to $19\frac{1}{4}$ SIZE OF BEAM 20-140 $\frac{1}{2}$ 24-140 $\frac{1}{2}$ 26-160 $\frac{1}{2}$ 28-165 $\frac{1}{2}$ 28-180 $\frac{1}{2}$ 30-180 $\frac{1}{2}$ 30-200 $\frac{1}{2}$	TYPE D SHOE  $13\frac{1}{2}$ to $14\frac{1}{2}$ SIZE OF BEAM 20-59 $\frac{1}{2}$ 20-64 $\frac{1}{2}$ 20-69 $\frac{1}{2}$ 20-72 $\frac{1}{2}$ 20-82 $\frac{1}{2}$ 24-73 $\frac{1}{2}$ 24-83 $\frac{1}{2}$ 26-90 $\frac{1}{2}$ 28-105 $\frac{1}{2}$
			TYPE E SHOE  $15\frac{1}{2}$ SIZE OF BEAM 30-120 $\frac{1}{2}$ NOTE: ALL SIDE FILLER TILE TO BE PYROBAR HOLLOW TILE.

SHOE TILE STANDARDS

ALL SHOES 18" LONG				TYPE	L	H	WGT. LBS. PER LIN. FT.
				A	3 $\frac{7}{8}$ "	4 $\frac{3}{4}$ "	7 $\frac{1}{2}$
				B	5"	5 $\frac{1}{4}$ "	9 $\frac{1}{2}$
				C	5 $\frac{1}{2}$ "	5 $\frac{1}{2}$ "	11
				D	6 $\frac{1}{2}$ "	5 $\frac{1}{4}$ "	11 $\frac{3}{4}$
				E	7 $\frac{1}{2}$ "	5 $\frac{3}{4}$ "	13 $\frac{1}{2}$
				F	8 $\frac{1}{2}$ "	5 $\frac{3}{4}$ "	16 $\frac{1}{2}$